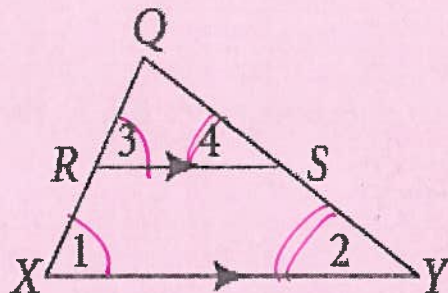
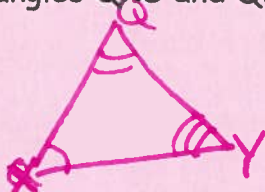


## Geometry Proportions with Parallel lines

Mark any congruent angles in the picture.

Draw and label the triangles QRS and QXY.



Write a similarity statement and the postulate or theorem that would prove the triangles similar.

$\triangle QRS \sim \triangle QXY$

AA~

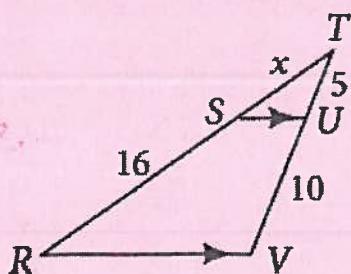
Do you agree or disagree with the following statement? Explain your reasoning.

If a line is inside and parallel to one side of a triangle then it will form two similar triangles.



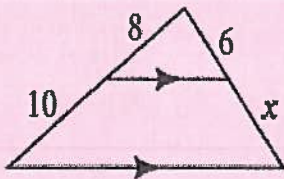
I agree, because of the parallel lines the corresponding angles will be  $\cong$  which will prove the  $\Delta$ 's similar by AA~.

Draw the similar triangles, write a proportion and use that to solve for the variable.



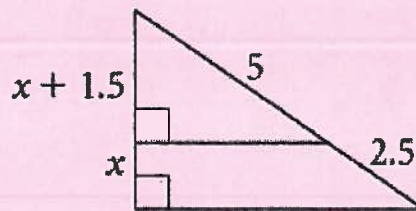
$$\frac{x}{16} = \frac{5}{10}$$

$x = 8$



$$\frac{8}{10} = \frac{6}{x}$$

$x = 7.5$



$$\frac{x + 1.5}{x} = \frac{5}{2.5}$$

$$2.5x + 3.75 = 5x$$

$$3.75 = 2.5x$$

$x = 1.5$

The previous page gave us an example of the *Side-Splitter Theorem*.

**Theorem 7-4 Side-Splitter Theorem**

If a line is parallel to one side of a triangle and intersects the other two sides, then it divides those sides proportionally.

Using the side splitter theorem, write a proportion comparing sides a, b, c, and d.

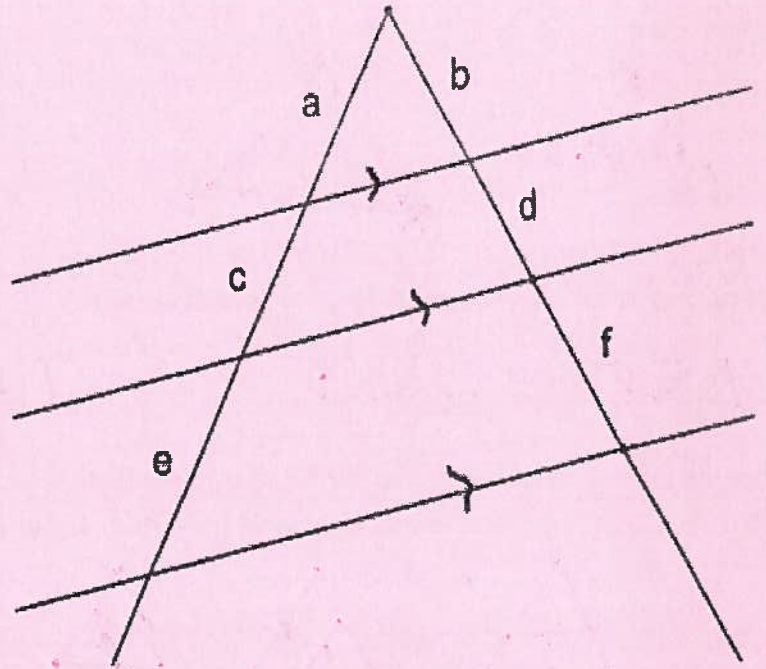
$$\frac{a}{c} = \frac{b}{d}$$

Now look what happens if we add a third parallel line. Can you write a proportion comparing sides c, d, e, and f?

$$\frac{c}{e} = \frac{d}{f}$$

Can you write a proportion comparing sides a, b, e, and f?

$$\frac{a}{e} = \frac{b}{f}$$



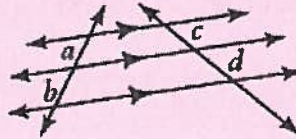
This is an example of addition to the side splitter theorem.

**Corollary**

**Corollary to Theorem 7-4**

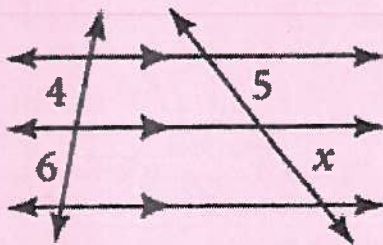
If three parallel lines intersect two transversals, then the segments intercepted on the transversals are proportional.

$$\frac{a}{b} = \frac{c}{d}$$



Notice in this picture you can not see the top of the triangle. We do not have to see it to know that it is there.

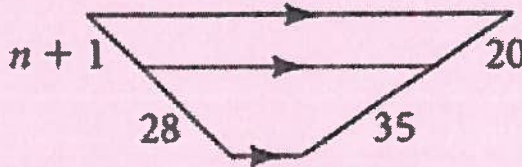
Write a proportion and solve these problems for the variable(s).



$$\frac{4}{6} = \frac{5}{x}$$

$$30 = 4x$$

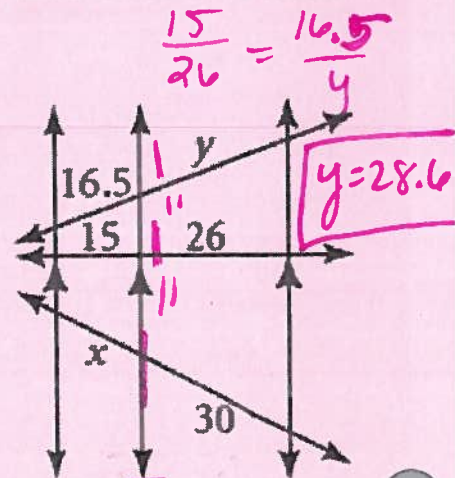
$$x = 7.5$$



$$\frac{n+1}{28} = \frac{20}{35}$$

$$35n + 35 = 560$$

$$n = 15$$



$$\frac{15}{26} = \frac{16.5}{y}$$

$$y = 28.6$$

$$\frac{x}{30} = \frac{15}{20}$$

$$26x = 450$$

$$x = \frac{225}{13} \approx 17.31$$